

WHAT IS CLAIMED IS:

1 1. A device for penetrating a container to access an interior of the
2 container, the device comprising:
3 a pierce member including an external surface and an internal surface forming
4 a hollow interior extending between a proximal end and a distal end, the distal end having a
5 slanted surface with a pierce leading edge on a first side between the external surface and the
6 internal surface, the external surface expanding outwardly in a region proximal of the distal
7 end in a direction toward the proximal end except on a second side opposite from the first
8 side.

1 2. The device of claim 1 wherein the external surface of the pierce
2 member expands outwardly to form a tapered external surface portion in the region proximal
3 of the distal end except on the second side.

1 3. The device of claim 2 wherein the tapered external surface portion of
2 the pierce member ends with a barb oriented toward the proximal end.

1 4. The device of claim 3 wherein the external surface of the pierce
2 member includes a flange disposed proximal of and spaced from the barb to form a groove
3 therebetween.

1 5. The device of claim 1 wherein the second side opposite from the first
2 side of the pierce member includes a generally planar surface which is perpendicular to a
3 plane extending between the first side and the second side.

1 6. The device of claim 1 wherein the internal surface of the pierce
2 member is substantially circular cylindrical.

1 7. The device of claim 1 wherein the internal surface of the pierce
2 member includes one or more barbs oriented to permit a tubing to be inserted inside the
3 pierce member only in a direction from the proximal end to the distal end.

1 8. The device of claim 1 wherein the internal surface of the pierce
2 member includes one or more air grooves extending between the proximal end and the distal
3 end.

9. The device of claim 1 wherein the internal surface of the pierce member includes an enlarged internal region having a larger bore size near the distal end than the interior near the proximal end of the pierce member.

10. The device of claim 9 further comprising a tubing inserted into the pierce member, the tubing including an enlarged portion near the distal end of the pierce member, the larger bore size near the distal end accommodating the enlarged portion of the tubing, the enlarged portion being larger in size than the interior of the pierce member near the proximal end to prevent the enlarged portion from passing through the pierce member in a direction from the distal end toward the proximal end.

11. The device of claim 10 further comprising a lock ring insert which is inserted into the tubing to form the enlarged portion.

12. The device of claim 1 further comprising an insertion tool having a cavity to receive a portion of the pierce member near the proximal end, the insertion tool having an enlarged body and being detachably coupled with the pierce member.

13. The device of claim 12 wherein the insertion tool includes a cutout extending proximally from the proximal end of the pierce member.

14. A device for penetrating a container to access an interior of the container, the device comprising:

a pierce member including an external surface and an internal surface forming a hollow interior extending between a proximal end and a distal end, the distal end having a pierce leading edge on a first side between the external surface and the internal surface;

wherein the external surface of the pierce member expands outwardly in a region proximal of the distal end in a direction toward the proximal end, except on a second side opposite from the first side, to form a tapered external surface portion in the region proximal of the distal end; and

wherein the external surface of the pierce member on the second side does not expand outwardly.

15. The device of claim 14 wherein the tapered external surface portion of the pierce member ends with a barb oriented toward the proximal end.

1 16. The device of claim 15 wherein the external surface of the pierce
2 member includes a flange disposed proximal of and spaced from the barb to form a groove
3 therebetween.

1 17. The device of claim 14 wherein the second side of the pierce member
2 includes a generally planar surface which is perpendicular to a plane extending between the
3 first side and the second side.

1 18. A method of penetrating a container to access an interior of the
2 container, the method comprising:

3 providing a pierce member which includes an external surface and an internal
4 surface forming a hollow interior extending between a proximal end and a distal end, the
5 distal end having a pierce leading edge on a first side between the external surface and the
6 internal surface, the external surface expanding outwardly in a region proximal of the distal
7 end in a direction toward the proximal end except on a second side opposite from the first
8 side; and

9 piercing a surface of the container with the pierce leading edge of the pierce
10 member and cutting a flap from the surface of the container by pushing the distal end of the
11 pierce member through the surface, the second side of the pierce member bearing against and
12 bending the flap toward the interior of the container without severing the flap from the
13 container.

1 19. The method of claim 18 wherein the external surface of the pierce
2 member expands outwardly to form a tapered external surface portion in the region proximal
3 of the distal end, the tapered external surface portion ending with a barb oriented toward the
4 proximal end; wherein the external surface of the pierce member includes a flange disposed
5 proximal of and spaced from the barb to form a groove therebetween; and further comprising
6 lodging a portion of the surface of the container from which the flap is cut into the groove
7 between the barb and the flange.

1 20. The method of claim 18 wherein the second side of the pierce member
2 includes a generally planar surface which is perpendicular to a plane extending between the
3 first side and the second side; and wherein the generally planar surface of the second side
4 bears against and bends the flap toward the interior of the container without severing the flap
5 from the container.

1 21. The method of claim 18 further comprising inserting a tubing through
2 the pierce member from the proximal end toward the distal end; wherein the internal surface
3 of the pierce member includes one or more barbs oriented to prevent the tubing from being
4 withdrawn in a direction from the distal end toward the proximal end of the pierce member.

1 22. The method of claim 18 further comprising, prior to piercing the
2 surface of the container with the pierce leading edge of the pierce member:
3 inserting a tubing into the interior of the pierce member;
4 enlarging a distal region of the tubing to form an enlarged portion on a side
5 disposed near the distal end of the pierce member to prevent the enlarged portion of the
6 tubing from passing through the pierce fitting in a direction from the distal end toward the
7 proximal end.

1 23. The method of claim 22 wherein enlarging the distal region of the
2 tubing comprises inserting a lock ring insert into the distal region of the tubing.